

PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

VOL. XXXVII—No. 9



November, 1911

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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS
(INSTITUTED 1852)

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NOVEMBER, 1911

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NEW YORK 1911

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ON BITUMINOUS MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

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AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed
in its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS

OF THE SOCIETY

October 18th, 1911.—The meeting was called to order at 8.30 p. m.; Rudolph Hering, M. Am. Soc. C. E., in the chair; Chas. Warren Hunt, Secretary; and present, also, 133 members and 20 guests.

A paper by George Gibbs, M. Am. Soc. C. E., entitled "The New York Tunnel Extension of the Pennsylvania Railroad: Station Construction, Road, Track, Yard Equipment, Electric Traction, and Locomotives," was presented by E. R. Hill, M. Am. Soc. C. E., who illustrated his remarks with lantern slides.

A written communication on the subject by J. V. Davies, M. Am. Soc. C. E., was presented by George D. Snyder, M. Am. Soc. C. E., and illustrated with lantern slides.

The Secretary presented written communications on the subject by Messrs. W. J. Wilgus, Charles S. Churchill, and G. R. Henderson, and the paper was discussed orally by Messrs. George B. Francis, Edwin B. Katte, N. W. Storer, and F. J. Sprague.

The Secretary announced the following deaths:

BENJAMIN FRANKLIN MACKALL, elected Member, March 6th, 1901; died April 5th, 1911.

WALTER HERBERT SEARS, elected Member, October 5th, 1904; died October 7th, 1911.

Adjourned.

November 1st, 1911.—The meeting was called to order at 8.30 P. M.; James Owen, M. Am. Soc. C. E., in the chair; Chas. Warren Hunt, Secretary; and present, also, 135 members and 27 guests.

The minutes of the meetings of September 20th and October 4th, 1911, were approved as printed in *Proceedings* for October, 1911.

A paper by Logan Waller Page, M. Am. Soc. C. E., entitled "Some of the Properties of Oil-Mixed Portland Cement Mortar and Concrete," was presented by A. T. Goldbeck, Esq. The Secretary read communications on the subject from Messrs. S. D. Newton, T. S. Oxholm, Lars R. Jorgensen, H. de B. Parsons, and Frank J. Phelan, and the paper was discussed orally by Messrs. D. E. McComb, W. F. Dunham, E. Kuiehling, R. S. Buck, Clifford Richardson, E. H. Thomes, R. D. Coombs, and A. T. Goldbeck.

A paper on the "Reinforced Concrete Bridge Across the Almendares River, Havana, Cuba," by Eugene Klapp and W. J. Douglas, Members, Am. Soc. C. E., was presented by Mr. Douglas and illustrated with lantern slides.

The Secretary presented a communication on the subject by L. J. Mensch, M. Am. Soc. C. E., and the paper was discussed orally by Messrs. W. B. Parsons, D. E. McComb, and F. Auryansen.

The Secretary announced the election of the following candidates on October 31st, 1911:

AS MEMBERS.

CHARLES KYES ALLEN, Portland, Ore.
JOHN PIERCE CHURCHILL, East Orange, N. J.
MELVILLE DOZIER, JR., Sacramento, Cal.
ROBERT ARNOLD FOSTER, Lewiston, Idaho.
ORLANDO WHITNEY NORCROSS, Worcester, Mass.

AS ASSOCIATE MEMBERS.

DONALD MINOR BELCHER, Wilkes-Barre, Pa.
HERMAN CLAUDE BERRY, Philadelphia, Pa.
ELLIOT CHIPMAN BROWN, New York City.
ROY HUNTLEY BROWN, Madison, Me.
JAMES MORGAN CLACK, Nevada, Mo.
JOHN EDWARD BARTHOLOMEW DAHLIN, Edison, Ill.

ALDRICH DURANT, Havana, Cuba.
FRANKLIN LINCOLN GIBBONEY, Roanoke, Va.
JAMES NICKERSON GLADDING, Albuquerque, N. Mex.
ROY COTSWORTH GOWDY, Fort Worth, Tex.
EDWIN OSCAR GREIFENHAGEN, Chicago, Ill.
VICTOR FRANK HAMMEL, New York City.
LESTER CLARK HAMMOND, Oyster Bay, N. Y.
ROY BAGLEY HAYES, Danville, Ky.
JOE BENTON HIGH, Brunswick, Ga.
NEIL CUMMINGS HOLDREDGE, New York City.
LUCIUS SANFORD HULBURD, Seneca Falls, N. Y.
WILLIAM NELSON JONES, Minneapolis, Minn.
CLARENCE ERWIN LANGLEY, Gatun, Canal Zone, Panama.
CHARLES AVERY LEE, Vancouver, B. C., Canada.
HARRY L McDONALD, Sacramento, Cal.
HARRY DEYOE MCGLASHAN, San Francisco, Cal.
LEON LINCOLN MORTON, Texarkana, Tex.
CHARLES ABRAHAM PARK, Detroit, Mich.
OTTO WALLACE PETERSON, Lone Pine, Cal.
JOSHUA FIELDEN RAMSBOTHAM, Freemantle, Western Australia.
FRED MORSE RANDLETT, Portland, Ore.
ARTHUR LESLIE STEVENS, Cleveland, Ohio.
CHESTER ARTHUR STUDWELL, Port Chester, N. Y.
CHARLES HARRY TISDALE, Guild, Tenn.
SANTIAGO VILAR Y BOY, Guatemala, Guatemala.
JOSEPH PALMER WADHAMS, New Haven, Conn.
JACKSON FRANKLIN WITT, Dallas, Tex.
ALBERT HARRISON WORLEY, Kansas City, Mo.
MORRIS ERNEST ZIPSER, Poughkeepsie, N. Y.

AS ASSOCIATE.

BURTON GARFIELD PHILBRICK, Oakland, Cal.

AS JUNIORS.

HENRY RAYMOND ANGWIN, Oakland, Cal.
HAROLD WILLIAM BLOEMKER, Philadelphia, Pa.
CARL DONALD BOSSERT, Washingtonville, Ohio.
WILLIAM BROOKS CLIFT, Wallsend, Ky.
ERNEST DELAVAN COLE, Coalinga, Cal.
EMIL FRANK CYKLER, Berkeley, Cal.
EARL RAYMOND DONLE, Providence, R. I.
EDWIN ARTHUR DOW, Iowa City, Iowa.
WALTER HANNA DUNLAP, Jenkins, Ky.
JOHN NORTH EDY, Billings, Mont.

FREDERICK SHELTON FOULKROD, Edgewood Park, Pa.
HENRY JAMES GARDNER, Jr., Buffalo, N. Y.
ARTHUR CARL GRIEWANK, San Francisco, Cal.
ISAAC HAUSMAN, Millwood, N. Y.
RALPH FRANCIS HEALY, Pittsburg, Pa.
WILLIAM HENRY JONES, Outlook, Sask., Canada.
LOUIS WILLIAM KLINGNER, Perth, Ont., Canada.
CLAUDE ALFRED LATIMER, New York City.
ERNEST BENJAMIN NELSON, Cristobal, Canal Zone, Panama.
WILLIAM CHRISTIAN REUKAUF, Brooklyn, N. Y.
ROSWELL MORTON ROPER, East Orange, N. J.
HOMER JENNER WILKINS, Oklahoma City, Okla.
WALTER FERRELL WINTON, Nashville, Tenn.

The Secretary announced the transfer of the following candidates on October 31st, 1911:

FROM ASSOCIATE MEMBER TO MEMBER.

THOMAS CLARK ATWOOD, New York City.
HYOTARO INAGAKI, Tokyo, Japan.
CHARLES JOSEPH MCGONIGLE, Portland, Ore.
ROBERT ALLEN PENDERGRASS, Pittsburg, Pa.
JAMES WALLACE TOWER, New York City.
ROBERT SPURR WESTON, Boston, Mass.
CHARLES SUMNER WILLIAMSON, Chicago, Ill.

FROM JUNIOR TO ASSOCIATE MEMBER.

LUDLOW OSMOND BARKER, Jr., New Cumberland, W. Va.
LYMAN EDGAR BISHOP, Albany, Wyo.
WILLIAM EARL ELAM, Greenville, Miss.
LLOYD WOOLSEY GREENE, Oswego, N. Y.
ORLANDO WILLIAM IRWIN, Detroit, Mich.
FRANK SNOW PARRIGIN, Gainesville, Fla.
CHARLES JUDSON PATERSON, Cleveland, Ohio.
DAVID ELLIOTT PENDLETON, Ennis, Tex.
GEORGE JOHNSON WALKER, Pittsburg, Pa.

The Secretary announced the following death:

GEORGE JOSEPH BELL, elected Associate Member, November 2d, 1898; Member, October 1st, 1902; died October 6th, 1911.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

October 31st, 1911.—President Endicott in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Boller, Flad, Kimball, Loomis, Loweth, Macdonald, Ridgway, Snow, Stott, Talbot, and Thompson.

The President was authorized to appoint a representative of this Society to attend the Sixth Congress of the International Association for Testing Materials, to be held in New York, September 3d, 1912.

The resignation of George Benjamin Lorenz as an Associate Member was accepted.

Ballots for membership were canvassed, resulting in the election of 5 Members, 35 Associate Members, 1 Associate, and 23 Juniors, and the transfer of 9 Juniors to the grade of Associate Member.

Seven Associate Members were transferred to the grade of Member.

Applications were considered, and other routine business transacted.

Adjourned.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

December 6th, 1911.—8.30 P. M.—This will be a regular business meeting. Two papers will be presented for discussion: "Experiments on the Flow of Water in Wood Stave Pipes," by E. A. Moritz, Assoc. M. Am. Soc. C. E., and "The St. Croix River Bridge," by C. A. P. Turner, M. Am. Soc. C. E.

These papers were printed in *Proceedings* for October, 1911.

December 20th, 1911.—8.30 P. M.—At this meeting three papers will be presented for discussion, as follows: "Construction of the Morena Rock Fill Dam, San Diego County, California," by M. M. O'Shaughnessy, M. Am. Soc. C. E.; "The Halligan Dam: A Reinforced Masonry Structure," by G. N. Houston, M. Am. Soc. C. E.; and "Provision for Uplift and Ice Pressure in Designing Masonry Dams," by C. L. Harrison, M. Am. Soc. C. E.

The papers by Messrs. O'Shaughnessy and Houston were printed in *Proceedings* for October, 1911, and that by Mr. Harrison appears in this number of *Proceedings*.

January 3d, 1912.—8.30 P. M.—A regular business meeting will be held, and a paper by Henry C. Ripley, M. Am. Soc. C. E., entitled "How to Build a Stone Jetty on a Sand Bottom in the Open Sea," will be presented for discussion.

This paper is printed in this number of *Proceedings*.

ANNUAL MEETING

The Fifty-ninth Annual Meeting will be held at the Society House, on Wednesday and Thursday, January 17th and 18th, 1912. The Business Meeting will be called to order at 10 o'clock on Wednesday morning. The Annual Reports will be presented, officers for the ensuing year elected, members of the Nominating Committee appointed, Reports of Special Committees presented for discussion, and other business transacted.

SPECIAL MEETINGS FOR TOPICAL DISCUSSION

On the two days immediately following the Annual Meeting three meetings of the Society will be held at which the subject for discussion will be "Road Construction and Maintenance."

The meetings will be held as follows:

First Meeting, Friday, January 19th, 1912.—10 A. M.—Two sub-divisions of the subject will be discussed.

(1) "Drainage and Foundations."

The discussion on this topic will be introduced by James Owen, M. Am. Soc. C. E.

(2) "Fillers for Brick and Block Pavements."

The opening discussion on this topic will be by George W. Tillson, M. Am. Soc. C. E.

Second Meeting, Friday, January 19th.—2 P. M.—The following sub-division of the subject will be discussed:

(3) "Bituminous Surfaces."

This topic will be introduced by A. W. Dean, M. Am. Soc. C. E.

Third Meeting, Saturday, January 20th.—10 A. M.—The following sub-division of the subject will be discussed:

(4) "Use of Bituminous Material in Penetration and Mixing Methods."

The discussion on this topic will be introduced by Linn White, Esq.

All Engineers, whether members of the Society or not, are cordially invited to attend these meetings, and it is hoped that the resulting discussion, when collated and published, will bring the whole subject up to date.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members, who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that, if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In reference to this work, the Appendices* to the Annual Reports

*Proceedings, Vol. XXXIII, p. 20 (January, 1907); Vol. XXXVII, p. 28 (January, 1911).

of the Board of Direction for the years ending December 31st, 1906, and December 31st, 1910, contain summaries of all searches made to date.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and, on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which, from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions, only, will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., M. Am. Soc. C. E., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

(Abstract of Minutes of Meeting)

October 20th, 1911.—The meeting was called to order; President Derleth in the chair; E. T. Thurston, Jr., Secretary; and present, also, 79 members and guests.

An illustrated lecture on "The Irrigation Developments on the Lower Colorado River, with Their Allied Problems," was delivered by H. T. Cory, M. Am. Soc. C. E., and the subject was discussed by Messrs. C. E. Grunsky and F. C. Herrmann.

Adjourned.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Gavin N. Houston, M. Am. Soc. C. E., 409 Equitable Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, and until further notice, will take place at the Colorado Traffic Club.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

October 14th, 1911.—The meeting was called to order; President Anderson in the chair; G. N. Houston, Secretary; and present, also, 6 members and 2 guests.

The paper entitled "Economic Canal Location in Uniform Countries," by Lyman E. Bishop, Jun. Am. Soc. C. E., was discussed by Messrs. C. C. Williams, Sam G. Porter, and others.

Adjourned.

PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms and at all Meetings:

American Institute of Mining Engineers, 29 West Thirty-ninth Street, New York City.

American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66, Germany.

Associação dos Engenheiros Cívis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West, Montreal, Que., Canada.

- Civil Engineers' Society of St. Paul, St. Paul, Minn.**
Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.
Cleveland Institute of Engineers, Middlesbrough, England.
Dansk Ingeniorforening, Amaliegade 38, Copenhagen, Denmark.
Engineers' and Architects' Club of Louisville, Ky., 303 Norton Building, Fourth and Jefferson Streets, Louisville, Ky.
Engineers' Club of Baltimore, Baltimore, Md.
Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.
Engineers' Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pa.
Engineers' Club of St. Louis, 3817 Olive Street, St. Louis, Mo.
Engineers' Club of Toronto, 96 King Street, West, Toronto, Ont., Canada.
Engineers' Society of Northeastern Pennsylvania, 302 Board of Trade Building, Scranton, Pa.
Engineers' Society of Pennsylvania, 219 Market Street, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania, 2511 Oliver Building, Pittsburg, Pa.
Institute of Marine Engineers, 58 Romford Road, Stratford, London, E., England.
Institution of Engineers of the River Plate, Buenos Aires, Argentine Republic.
Institute of Naval Architects, 5 Adelphi Terrace, London, W. C., England.
Junior Institution of Engineers, 39 Victoria Street, Westminster, S. W., London, England.
Koninklijk Instituut van Ingenieurs, The Hague, The Netherlands.
Louisiana Engineering Society, 321 Hibernia Bank Building, New Orleans, La.
Memphis Engineering Society, Memphis, Tenn.
Midland Institute of Mining, Civil and Mechanical Engineers, Sheffield, England.
Montana Society of Engineers, Butte, Montana.
North of England Institute of Mining and Mechanical Engineers, Newcastle-upon-Tyne, England.
Oesterreichischer Ingenieur- und Architekten-Verein, Eschenbachgasse 9, Vienna, Austria.
Pacific Northwest Society of Engineers, 803 Central Building, Seattle, Wash.
Rochester Engineering Society, Rochester, N. Y.
Sachsischer Ingenieur- und Architekten-Verein, Dresden, Germany.
Sociedad Colombiana de Ingenieros, Bogota, Colombia.

Sociedad de Ingenieros del Peru, Lima, Peru.

Societe des Ingenieurs Civils de France, 19 Rue Blanche, Paris, France.

Society of Engineers, 17 Victoria Street, Westminster, S. W., London, England.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18-1, Copenhagen, Denmark.

Western Society of Engineers, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From October 11th to November 6th, 1911)

DONATIONS.*

A MANUAL OF CIVIL ENGINEERING PRACTICE.

Specially Arranged for the Use of Municipal and County Engineers. By F. Noel Taylor. Cloth, $9\frac{1}{2} \times 6\frac{1}{2}$ in., illus., 12 + 809 pp. London, Charles Griffin & Company, Limited; Philadelphia, J. B. Lippincott Company, 1911. \$7.50. (Donated by J. B. Lippincott Company.)

It is stated in the preface that this book is designed to meet the need of young engineers who are preparing to occupy positions as Municipal and County Engineers, Borough Surveyors, etc. It deals, it is stated, with the general practice of municipal engineering work and the theoretical principles involved therein, much of the information having been gathered from the author's practical experience. The author's aim has been to present, in this volume, a compendium of Municipal Engineering, and he hopes that, in many ways, it may supplement Professor Rankine's book on Civil Engineering. Many formulas are included in the text, and the Appendices contain Water-works Regulations, General Conditions of Contract, Syllabus of Examinations, Examples of Cost of Engineering Works, etc. The Contents include such subjects as Design of Structures in Brick, Stone and Reinforced Concrete; Chimneys, Steel Construction, and Mechanical Engineering; Roads, Electric Tramways, Bridges, River Work, and Land Drainage; Hydraulics and Pumping Machinery; Water-works and Sources of Supply; Sewage Disposal, Filtration, and Purification; Sanitation, House Drainage, and Disinfection; Refuse Disposal; and Specifications. The subjects of Gas and Electrical Engineering are stated to have been touched on only as they relate to the duties of the surveyor.

THE THEORY AND PRACTICE OF TECHNICAL WRITING.

By Samuel Chandler Earle. Cloth, $7\frac{1}{2} \times 5\frac{1}{2}$ in., illus., 7 + 301 pp. New York, The Macmillan Company, 1911. \$1.25.

In this book the author offers a study of some of the fundamental problems of technical writing for students and engineers, which, it is stated, are not included in the courses on the subject in schools and which cannot be found in the several text-books now being published. He divides his subject-matter into two parts namely, Part I, in which the theory of technical exposition is considered, and Part II, wherein he discusses the applications of the principles in actual practice under different conditions, and the methods of obtaining the best results in technical writing. Brief examples of technical writing are given in the Appendix, not as models, it is stated, but as illustrations of better or worse ways of solving the problems. The author states that his aim in this book is simply to suggest definitely where the difficulties in technical writing lie and what may be done to overcome them. The Contents are: Introduction; Part I, A Study of the Principles of Logical Structure: Analysis by Means of Synopses; Fundamental Principles; Descriptive Exposition; Narrative Exposition; Directions; Description, Narration, and Directions Combined. Part II, Practical Application of Principles: The Essentials of Logical Structure; Addressing General Readers; Addressing Specialists; The Form of the Final Writing; Methods of Writing. Appendix: Illustrative Examples of Technical Writing; Index.

PROBLEMS IN RAILWAY REGULATION.

By Henry S. Haines, M. Am. Soc. C. E. Cloth, $8 \times 5\frac{1}{2}$ in., 7 + 582 pp. New York, The Macmillan Company, 1911. \$1.75. (Donated by the Author.)

The preface states that it is the author's purpose, in this book, to follow the course of railway regulation in the United States to the present time, to consider the several ways in which the American railway system has affected the general welfare, and to offer some suggestions as to its future regulation. It includes, it is stated, enough description of past conditions to trace to their origin the ills complained of, and to show the effects of attempts to cure them by governmental regulation, these conditions having been discussed in greater detail in the author's previous works, "Restrictive Railway Legislation" and "Railway Corporations as Public Servants," of which this work is stated to be in a sense a continuation. The Contents are: Introduction; The American Railway System: The Period of Formation; The American Railway System: The Period of Extension; The Period

*Unless otherwise specified, books in this list have been donated by the publisher.

of Reconstruction; The Period of Regulation; Recent Railway Regulation; Problems of Incorporation; Problems in Finance; Problems in Construction; Problems in Operation; Problems in Traffic; Problems in Discrimination; Problems in Rate Making; Problems of Capital and Labor; The Tendency of Government Regulation; Appendices; Index.

"HÜTTE": DES INGENIEURS TASCHENBUCH.

Herausgegeben vom Akademischen Verein Hütte, E. V. 21 Auflage. Cloth, $7\frac{1}{4}$ x 5 in., illus., 3 v. Berlin, Wilhelm Ernst & Sohn, 1911. 18 Marks.

This edition of the "Hütte" is issued as heretofore in three volumes. Volumes I and II contain material for the mechanical engineer and shipbuilder, and are stated to have been brought up to date by the addition of new chapters and by the revision and enlargement of many of the old ones. In this edition, it has been necessary, owing, it is stated, to the rapid development of engineering work, to issue Volume III separately under the title, "Hütte des Bauingenieurs." This volume is stated to be a complete handbook for building engineers, classified by subject, and to correspond to the handbook for metallurgists issued in 1910. The subject-matter in this volume is also stated to have been revised and many new chapters have been added. In all three volumes each chapter has been compiled by a specialist in the subject discussed. The Contents are: Band I, Mathematik; Mechanik starrer Körper; Mechanik tropfbar flüssiger Körper; Mechanik luftförmiger Körper; Wärme; Festigkeitslehre; Stoffkunde; Maschinenteile; Anhang; Sachverzeichnis des ersten, zweiten und dritten Bandes. Band II, Kraftmaschinen; Arbeitsmaschinen; Schiffbau und Schiffsmaschinen; Automobilbau; Beleuchtung; Elektrotechnik. Band III, Hütte des Bauingenieurs: Vermessungskunde; Statik der Baukonstruktionen; Grundbau; Eisenbetonbau; Hochbau; Lüftung und Heizung; Fabrikanlagen; Baumaschinen; Wasserbau; Wasserkraftanlagen; Strassenbau; Städtebau; Wasserversorgung; Städteentwässerung; Eisenbahnwesen; Brückenbau; Sachverzeichnis des ersten, zweiten und dritten Bandes.

RAILWAY RATE THEORIES

Of the Interstate Commerce Commission. By M. B. Hammond. Cloth, $8\frac{3}{4}$ x $5\frac{1}{2}$ in., 6 + 200 pp. Cambridge, Harvard University, 1911.

The author's purpose, it is stated, is to evolve a theory of railroad rates from a study of the decisions handed down by the Interstate Commerce Commission from 1887 to 1896, which decisions, he states, appear to offer the best opportunity for such an inductive study applicable to American conditions. By analyzing the Commission's decisions, he has prepared a standard, such as value of commodity, cost of service, etc., by which railway rates may be measured and compared and has endeavored, he states, to show the extent to which the Interstate Commerce Commission has made use of such a standard as a basis for determining the reasonableness of rates. This is followed by a discussion of how these diverse principles can be harmonized, and how their relations to each other can be adjusted so as to make it possible to evolve a complete theory of rate making. The Chapter headings are: Introductory; Commission's Preliminary Statement of the Fundamental Principle of Rate Making; Value of Commodity as a Rate Basis; Cost of Service as a Rate Basis; Distance as a Factor in Rate Making; Natural Advantages of Location; Competition as a Factor in Rate Making; Class and Sectional Interests; Fair Return on Investment; General Summary and Conclusions; Table of Cases Cited.

ROCK DRILLING

With Particular Reference to Open Cut Excavation and Submarine Rock Removal. By Richard T. Dana and W. L. Saunders, Members, Am. Soc. C. E. Data Compiled by Construction Service Company. Cloth, 9 x 6 in., illus., 8 + 319 pp. New York, John Wiley & Sons; London, Chapman & Hall, Limited, 1911. \$4.00.

Because of its contribution to the general economy of construction, its effect upon the cost of rock work, and its influence on standard engineering methods, it is stated that the rock drill offers a class of problems which have long deserved a special study and a special treatise. In an effort to place the study of rock drilling on a scientific basis and to establish the "best" and most economic method of using the rock drill for any given condition, the Ingersoll-Rand Company, it is stated, instituted an investigation into the economics of drilling and, in this volume, presents the results to engineers and contractors. Descriptions of drills and the cost of both land and subaqueous drilling are given, together with descriptions of field methods and costs of work done in various parts of the country. The Contents are: Blasting and Explosives; Drilling on Land; Subaqueous Drilling; Subaqueous Drilling by the Platform Method; Hints and Suggestions for Rock Drilling and Blasting; Index.

THE THEORY OF STRUCTURES.

By Charles M. Spofford, M. Am. Soc. C. E. Cloth, $9\frac{1}{2} \times 6\frac{1}{2}$ in., illus., 13 + 411 pp. New York and London, McGraw-Hill Book Company, 1911. \$4.00.

The preface states that the purpose of this book is to present in a thorough and logical manner the fundamental theories on which the design of the more important elements of engineering structures is based and to illustrate their application by numerous examples. The subject-matter is stated to be confined almost entirely to the treatment of statically determined structures, and while the theories presented are said to be, for the greater part, only such as have been in common use for many years, the method of treatment frequently differs considerably from that found in other books. The author calls special attention to the early introduction of the influence line and to its use in determining and illustrating analytical methods, as well as to the chapter on Deflections. The Contents are: Outer and Inner Forces; Laws of Statics, Reactions, Shears and Moments, Influence Lines; Concentrated Load Systems; Beam Design; Plate Girder Design; Simple Trusses; Bridge Trusses with Secondary Web Systems, including the Baltimore and Pettit Trusses; Trusses with Multiple Web Systems, Lateral and Portal Bracing, Transverse Bents, Viaduct Towers; Cantilever Bridges; Three-Hinged Arches; Design of Columns and Tension Members; Pin and Riveted Truss Joints; Graphical Statics; Deflection and Camber; Continuous and Partially Continuous Girders and Swing Bridge Reactions; Index.

FRAMED STRUCTURES AND GIRDERS:

Theory and Practice. By Edgar Marburg, M. Am. Soc. C. E. Vol. I, Stresses, Pt. 1. Cloth, $9\frac{1}{2} \times 6$ in., illus., 21 + 540 pp. New York and London, McGraw-Hill Book Company, 1911. \$4.00.

The present volume of this work, which the author states is to appear in three volumes, is devoted mainly to the derivation of the fundamental principles of statics, the determination of shears and bending moments in beams, and the analysis of roof and bridge trusses resting on two supports. The author states that he has used about two-thirds of the subject-matter in his classes, and while the work is designed primarily as a text-book, he hopes it may be found useful for reference as well. The earlier chapters are devoted, it is stated, partly or wholly to a brief but critical consideration of the principles of statics on account of their fundamental importance. In Chapter V are presented the general methods, graphic and algebraic, applicable to the analysis of stresses in framed structures, both roof and bridge trusses being discussed. Chapter VI is devoted exclusively to the bringing out of the important underlying principles of stresses in roof trusses. In the following chapters are presented analyses of stresses in bridge trusses; a brief historical account of bridge building and the evolution of the modern bridge truss, with special reference to American conditions; skew bridges and bridges on curves; stresses in lateral and sway bracing and in viaduct towers; and deformation in trusses, and camber. The Contents are: General Considerations and Definitions; The Equilibrium of Coplanar Forces; Application of the Laws of Equilibrium to the Determination of Reactions; Shears and Bending Moments in Simple Beams; Application of the Laws of Equilibrium to the Determination of Stresses; Roof Trusses; Stresses in Bridge Trusses with Horizontal Chords; Stresses in Bridge Trusses with Inclined Chords; Modern Bridge Trusses and Their Development; Stresses in Bridge Trusses with Sub-Panels; Live-Load Stresses by Graphic Methods—Influence Lines; Skew Bridges and Bridges on Curves; Live Loading for Bridges; Lateral Bracing and Transverse Bracing; Stresses in Viaduct Towers; Deformation of Trusses, Camber; Index.

THE WIDTH AND ARRANGEMENT OF STREETS.

A Study in Town Planning. By Charles Mulford Robinson. Cloth, $9\frac{1}{2} \times 6$ in., illus., 10 + 199 pp. New York, The Engineering News Publishing Company; London, Archibald Constable & Co., Ltd., 1911. \$2.00.

The subject-matter of this book was offered, it is stated, as a general thesis at the International Town Planning Conference held in London in 1910, and is said to contain the results of the author's observations in some thirty towns and cities from the Atlantic Coast to the mid-Pacific, where he studied and diagnosed their special needs as regards the city plan. The book is stated to deal particularly with the attractive development of residential and suburban tracts, and the author has endeavored to state facts as to street platting which should be understood by city officials, the tract developer, the lot buyer, and the tenant. A part of Chapter I and Chapters II, III, and IV are devoted to pointing out defects in the usual present practice of street design and the advantages of a closer adjustment to functions. The remainder of the book contains the constructive suggestions. The Chapter headings are: Main Divisions of a Street System: The Standardizing of Streets; Street Width and Housing; Street Width and Land Values; Main Traffic

Streets; How to Lessen the Cost of Wide Streets; Provision of Central Control; Platting of Minor Residence Streets in High Class Districts; The Development of High Class Minor Streets; The Platting of Minor Streets for Humble Homes; Public Reservations Other Than Streets; Conclusion; Appendix; Index.

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BY PURCHASE.

Practical Hygiene: A Manual for Students, Physicians, and Health Officers. By Charles Harrington. Fourth Edition, Revised and Enlarged by Mark Wyman Richardson. Lea & Febiger, Philadelphia and New York, 1911.

The Corrosion of Iron and Steel. By J. Newton Friend. Longmans, Green and Co., New York and London, 1911.

Themen der Physikalischen Chemie. Von Emil Baur. Akademische Verlagsgesellschaft, m. b. H., Leipzig, 1910.

Drying Machinery and Practice: A Handbook on the Theory and Practice of Drying and Desiccating, with Classified Description of Installations, Machinery, and Apparatus, Including also a Glossary of Technical Terms and Bibliography. By Thomas G. Marlow. D. Van Nostrand Company, New York; Crosby Lockwood and Son, London, 1910.

Power Plant Testing: A Manual for Testing Engines, Turbines, Boilers, Pumps, Refrigerating Machinery, Fans, Fuels, Materials of Construction, etc. By James Ambrose Moyer. McGraw-Hill Book Company, New York and London, 1911.

Electric Traction and Transmission Engineering. By Samuel Sheldon and Erich Hausmann. D. Van Nostrand Company, New York, 1911.

The Production of Malleable Castings: A Practical Treatise on the Processes Involved in the Manufacture of Malleable Cast Iron. By Richard Moldenke. The Penton Publishing Company, Cleveland, Ohio, 1910.

Petroleum Mining and Oil-Field Development: A Guide to the Exploration of Petroleum Lands, and a Study of the Engineering Problems Connected with the Winning of Petroleum, Including Statistical Data of Important Oil-Fields, Notes on the Origin and Distribution of Petroleum, and a Description of the Methods of Utilising Oil and Gas Fuels. By A. Beeby Thompson. D. Van Nostrand Company, New York; Crosby Lockwood and Son, London, 1910.

SUMMARY OF ACCESSIONS

(From October 11th to November 6th, 1911)

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	M.	Oct.	31, 1911
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	M.	Oct.	3, 1911
BROWN, WILLIAM. Chairman and Managing Director, William Simons & Co., Ltd., 7 Whittingehame Gardens, Kelvinside, Glasgow, Scotland.....		Oct.	3, 1911
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JUNIORS

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PARSONS, MAURICE GIESY. Intake 4, Bishop Creek, Cal...	Oct.	3, 1911
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WELLS, CHESTER GORDON. Asst. Engr., Ore. Short Line R. R. Co., and S. P. Co. (Lines East of Sparks), Box 382, Pocatello, Idaho.....		June 6, 1911
WINTON, WALTER FERRELL. 1916 Adelia Ave., Nash- ville, Tenn.		Oct. 31, 1911
YOST, HOWARD McCLEMONDS. Massillon, Ohio.....		June 6, 1911

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DEATHS

- BELL, GEORGE JOSEPH. Elected Associate Member, November 2d, 1898; Member, October 1st, 1902; died October 6th, 1911.
 MACKALL, BENJAMIN FRANKLIN. Elected Member, March 6th, 1901; died April 5th, 1911.
 SEARS, WALTER HERBERT. Elected Member, October 5th, 1904; died October 7th, 1911.

Total Membership of the Society, November 7th, 1911,
6 277.

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(October 10th to November 6th, 1911)

NOTE.—This list is published for the purpose of placing before the members of the Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

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In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

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| (1) <i>Journal</i> , Assoc. Eng. Soc., 31 Milk St., Boston, Mass., 30c. | (28) <i>Journal</i> , New England Water-Works Assoc., Boston, Mass., \$1. |
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| (5) <i>Transactions</i> , Can. Soc. C. E., Montreal, Que., Canada. | (32) <i>Mémoires et Compte Rendu des Travaux</i> , Soc. Ing. Civ. de France, Paris, France. |
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| (27) <i>Electrical World</i> , New York City, 10c. | (56) <i>Transactions</i> , Am. Inst. Min. Engrs., New York City, \$5. |

- (57) *Colliery Guardian*, London, England.
- (58) *Proceedings*, Engrs.' Soc. W. Pa., 803 Fulton Bldg., Pittsburg, Pa., 50c.
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- (79) *Forscherarbeiten*, Vienna, Austria.
- (80) *Tonindustrie Zeitung*, Berlin, Germany.
- (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
- (83) *Progressive Age*, New York City, 15c.
- (84) *Le Ciment*, Paris, France.
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- (98) *Journal*, Engrs. Soc. Pa., 219 Market St., Harrisburg, Pa., 30c.
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- (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., \$1.
- (101) *Metal Worker*, New York City, 10c.
- (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
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- (106) *Transactions*, Inst. of Mining Engrs., London, England, 6 shillings.
- (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
- (108) *Southern Machinery*, Atlanta, Ga., 10c.

LIST OF ARTICLES.

Bridges.

- The Transporter Bridge over the River Tees.* (12) Sept. 29.
- Economic Construction of Storage Bins and Trestles at Cement Plants.* W. S. Marston. (4) Oct.
- The Superstructure of the Passyunk Bridge.* Henry H. Quimby. (2) Oct.
- The Coteau Railway Bridge Across the St. Lawrence River, Canada.* Howard G. Kelley. (11) Oct. 6.
- A Novel Bridge for Chicago.* (96) Oct. 12.
- Demolition of Bridlington Railway Bridge, North Eastern Railway.* (11) Oct. 13.
- Recommendation for Draw-Bridges on Main Track. (From paper read before the Ry. Signal Assoc.) (18) Oct. 14.
- Rye Outlet Bridge at Kensico Reservoir, Catskill Aqueduct; a Concrete Arch Bridge with Two Arch Rings in Each Span and Transverse Spandrel Walls.* (14) Oct. 14.
- Reinforcing the Lateral Systems of the Williamsburg Bridge.* (14) Oct. 21.
- The Valserine River Long-Span Stone Arch Bridge in France. (14) Oct. 21.

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| (11) <i>Engineering</i> (London), W. H. Wiley, New York City, 25c. | (38) <i>Revue Générale des Chemins de Fer et des Tramways</i> , Paris, France. |
| (12) <i>The Engineer</i> (London), International News Co., New York City, 35c. | (41) <i>Modern Machinery</i> , Chicago, Ill., 10c. |
| (13) <i>Engineering News</i> , New York City, 15c. | (42) <i>Proceedings</i> , Am. Inst. Elec. Engrs., New York City, 50c. |
| (14) <i>The Engineering Record</i> , New York City, 12c. | (43) <i>Annales des Ponts et Chaussées</i> , Paris, France. |
| (15) <i>Railway Age Gazette</i> , New York City, 15c. | (44) <i>Journal</i> , Military Service Institution, Governors Island, New York Harbor, 50c. |
| (16) <i>Engineering and Mining Journal</i> , New York City, 15c. | (45) <i>Mines and Minerals</i> , Scranton, Pa., 20c. |
| (17) <i>Electric Railway Journal</i> , New York City, 10c. | (46) <i>Scientific American</i> , New York City, 8c. |
| (18) <i>Railway and Engineering Review</i> , Chicago, Ill., 10c. | (47) <i>Mechanical Engineer</i> , Manchester, England. |
| (19) <i>Scientific American Supplement</i> , New York City, 10c. | (48) <i>Zeitschrift, Verein Deutscher Ingenieure</i> , Berlin, Germany. |
| (20) <i>Iron Age</i> , New York City, 10c. | (49) <i>Zeitschrift für Bauwesen</i> , Berlin, Germany. |
| (21) <i>Railway Engineer</i> , London, England, 25c. | (50) <i>Stahl und Eisen</i> , Düsseldorf, Germany. |
| (22) <i>Iron and Coal Trades Review</i> , London, England, 25c. | (51) <i>Deutsche Bauzeitung</i> , Berlin, Germany. |
| (23) <i>Bulletin</i> , American Iron and Steel Assoc., Philadelphia, Pa. | (52) <i>Rigaskie Industrie-Zeitung</i> , Riga, Russia. |
| (24) <i>American Gas Light Journal</i> , New York City, 10c. | (53) <i>Zeitschrift, Oesterreichischer Ingenieur und Architekten Verein</i> , Vienna, Austria. |
| (25) <i>American Engineer</i> , New York City, 20c. | (54) <i>Transactions</i> , Am. Soc. C. E., New York City, \$4. |
| (26) <i>Electrical Review</i> , London, England. | (55) <i>Transactions</i> , Am. Soc. M. E., New York City, \$10. |
| (27) <i>Electrical World</i> , New York City, 10c. | (56) <i>Transactions</i> , Am. Inst. Min. Engrs., New York City, \$5. |

- (57) *Colliery Guardian*, London, England.
- (58) *Proceedings*, Engrs.' Soc. W. Pa., 803 Fulton Bldg., Pittsburg, Pa., 50c.
- (59) *Transactions*, Mining Inst. of Scotland, London and Newcastle-upon-Tyne, England.
- (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
- (61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
- (62) *Industrial World*, 59 Ninth St., Pittsburg, Pa.
- (63) *Minutes of Proceedings*, Inst. C. E., London, England.
- (64) *Power*, New York City, 20c.
- (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
- (66) *Journal of Gas Lighting*, London, England, 15c.
- (67) *Cement and Engineering News*, Chicago, Ill., 25c.
- (68) *Mining Journal*, London, England.
- (70) *Engineering Review*, New York City, 10c.
- (71) *Journal*, Iron and Steel Inst., London, England.
- (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
- (73) *Electrician*, London, England, 18c.
- (74) *Transactions*, Inst. of Min. and Metal., London, England.
- (75) *Proceedings*, Inst. of Mech. Engrs., London, England.
- (76) *Brick*, Chicago, Ill., 10c.
- (77) *Journal*, Inst. Elec. Engrs., London, England.
- (78) *Beton und Eisen*, Vienna, Austria.
- (79) *Forschungsarbeiten*, Vienna, Austria.
- (80) *Industrie Zeitung*, Berlin, Germany.
- (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
- (83) *Progressive Age*, New York City, 15c.
- (84) *Le Ciment*, Paris, France.
- (85) *Proceedings* Am. Ry. Eng. and M. of W. Assoc., Chicago, Ill.
- (86) *Engineering-Contracting*, Chicago, Ill., 10c.
- (87) *Roadmaster and Foreman*, Chicago, Ill., 10c.
- (88) *Bulletin* of the International Ry. Congress Assoc., Brussels, Belgium.
- (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa.
- (90) *Transactions*, Inst. of Naval Archts., London, England.
- (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
- (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
- (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
- (94) *The Boiler Maker*, New York City, 10c.
- (95) *International Marine Engineering*, New York City, 20c.
- (96) *Canadian Engineer*, Toronto, Ont., Canada, 15c.
- (97) *Turbine*, Berlin, Germany, 1 Mark.
- (98) *Journal*, Engrs. Soc. Pa., 219 Market St., Harrisburg, Pa., 30c.
- (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$1.50.
- (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., \$1.
- (101) *Metal Worker*, New York City, 10c.
- (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
- (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
- (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
- (105) *Metallurgical and Chemical Engineering*, New York City, 25c.
- (106) *Transactions*, Inst. of Mining Engrs., London, England, 6 shillings.
- (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
- (108) *Southern Machinery*, Atlanta, Ga., 10c.

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- Economic Construction of Storage Bins and Trestles at Cement Plants.* W. S. Marston. (4) Oct.
- The Superstructure of the Passyunk Bridge.* Henry H. Quimby. (2) Oct.
- The Coteau Railway Bridge Across the St. Lawrence River, Canada.* Howard G. Kelley. (11) Oct. 6.
- A Novel Bridge for Chicago.* (96) Oct. 12.
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- Recommendation for Draw-Bridges on Main Track. (From paper read before the Ry. Signal Assoc.) (18) Oct. 14.
- Rye Outlet Bridge at Kensico Reservoir, Catskill Aqueduct; a Concrete Arch Bridge with Two Arch Rings in Each Span and Transverse Spandrel Walls.* (14) Oct. 14.
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- The Valserine River Long-Span Stone Arch Bridge in France. (14) Oct. 21.

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 The Heating of Cables with Current.* S. W. Melsom. (77) Sept.
 A Power Company's Testing Department. E. Fawcett. (77) Sept.
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 Automatic Telephone Exchange Systems.* W. Altken. (77) Sept.
 Single-Phase Commutator Motors, Especially the Latour-Winter-Elchberg Type.* G. W. P. Page and G. J. Scott. (77) Sept.
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 The Determination of Synchronous and Asynchronous Reactance.* J. Rezelman. (73) Serial beginning Sept. 29.
 Report on Motor-Generators, Converters and Rectifiers. Silvanus P. Thompson. (Paper read before the International Congress of the Applications of Electricity.) (73) Sept. 29; (47) Oct. 6.
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- Recent Advances in High Temperature Measurement. J. A. Harker. (From *Science Progress*.) (19) Nov. 4.

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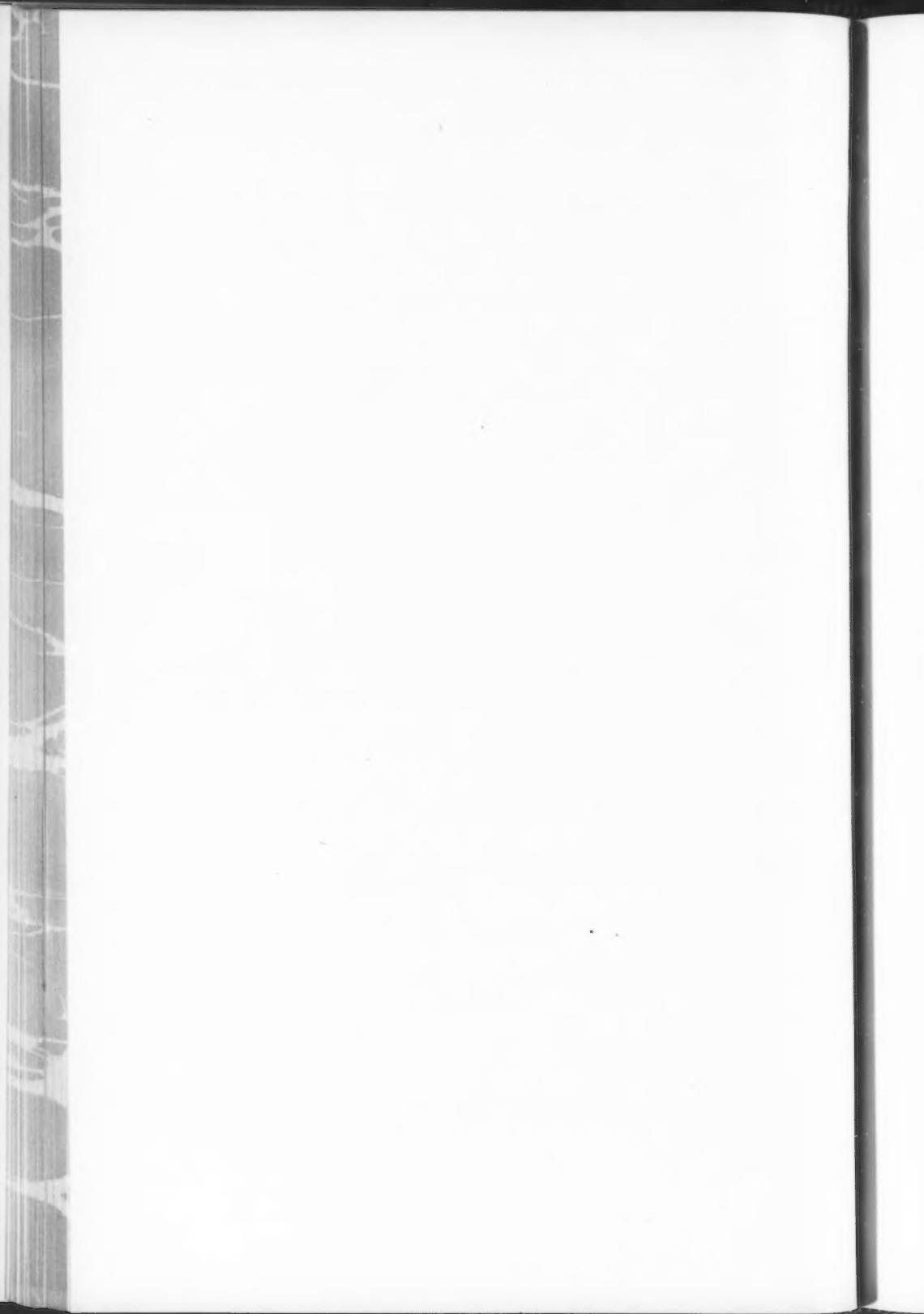
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- Experimental Work in Preserving Surfaces of Old Macadam or Gravel Roads Against Effects of Automobile Travel. (86) Oct. 18.
- Earth Roads, Construction and Maintenance. Robert Gibbs Thomas. (Paper read before the South Carolina Good Roads Assoc.) (96) Oct. 19.
- The Good Roads of Madison County, Tennessee. Atwell Thompson. (Abstract of paper read before the International Good Roads Congress.) (96) Oct. 19.
- A New Consistometer for Use in Testing Bituminous Road Materials.* W. W. Crosby. (104) Oct. 20.
- Paving and Care of Streets. (14) Oct. 28.
- The Pavements of the Borough of Manhattan, New York City. (14) Oct. 28.
- Distributing and Mixing Machinery for Construction and Maintenance of Bituminous Pavements and Surfaces.* Arthur H. Blanchard, M. Am. Soc. C. E. (60) Nov.
- Brick Road Construction about Cleveland and Buffalo.* (60) Nov.
- Les Avantages du Goudronnage des Chaussées ses Effets sur la Végétation. Guglielminetti. (33) July 22.

Railroads.

- The Present Position of Electric Traction on Main Lines in Europe. J. B. Sparks. (77) Sept.
- Recent Electric Locomotive Practice and the High-Tension Direct-Current Railway System.* Allan Monkhouse. (77) Sept.
- Some Experiments with Trucks. George G. Floyd. (61) Sept. 19.
- Locomotive Exhibits at Turin.* (12) Serial beginning Sept. 29.
- The Use of Electric Locomotives for Shunting Purposes. Albert H. Marshall. (Abstract of paper read before the Cleveland Inst. of Engrs.) (73) Sept. 29.
- Reinforced Concrete for Railway Engineering Works.* J. D. W. Ball, Assoc. M. Inst. C. E. (12) Serial beginning Sept. 29.
- Note on Steel Tires for High Speed Locomotives.* P. H. Dudley. (88) Oct.
- Note on the Electrification of the old Giovi Line on the Italian State Railway.* (88) Oct.
- Review of Traffic Questions in France. C. Colson. (From *Revue Politique et Parlementaire*.) (88) Oct.
- Private Owner's Wagons; Specifications and Tests for Materials.* (21) Oct.
- New Locomotive Sand Box.* (21) Oct.
- Preservative Treatment of Hemlock and Tamarack Ties.* (87) Oct.
- New Locomotive Terminal, Chicago & Alton, at Bloomington, Ill.* (87) Oct.
- Methods and Cost of Building a Railroad Extension.* (86) Oct. 11.
- Method of Supporting and Fastening Rails in New Northwestern Train Shed, Chicago.* (86) Oct. 11.
- An External Throttle Valve for Locomotives.* (13) Oct. 12.
- Construction Work on the Cleveland Short Line.* (15) Oct. 13.
- Locomotive Proportions. Lawford H. Fry. (12) Oct. 13.
- Tramway Track-Methods of Construction and Maintenance. J. Grierson, H. Mattinson and R. B. Holt. (Papers read before the Municipal Tramways Assoc.) (73) Oct. 13.
- Hoosac Tunnel Single-Phase Locomotives.* (17) Oct. 14.
- Oil and Waste Reclaiming Apparatus, Canadian Pacific Ry.* (18) Oct. 14.
- Cost Data on Railway Grade Works in Mexico in 1907.* Howard Egleston, M. Am. Soc. Engr. Contr. (86) Oct. 18.
- Machines for Boring and Trimming Ties and Driving Screw Spikes.* (13) Oct. 19.
- The International Franco-Spanish Noguera-Pallaresa Railway. (12) Oct. 20.
- The Single-Phase Tramway in the Suburbs of Parma.* (73) Oct. 20.
- Locomotive with Smoke-Box Superheater for the Great Northern Railway of Ireland.* (12) Oct. 20.
- Construction Work on Milwaukee Belt Section of the Milwaukee, Sparta & Northwestern.* (15) Oct. 20.
- Right of Way Signs on Chicago Great Western.* (15) Oct. 20.
- Revetment Work on the Missouri Pacific.* (15) Oct. 20.
- Power Distributing System of the Oakland, Alameda and Berkeley Suburban Lines of the Southern Pacific Company.* (17) Serial beginning Oct. 21.
- The New Rapid Transit Route Between New York and Newark.* (14) Oct. 21.
- Panama Canal Electric Towing Locomotives.* (27) Oct. 21; (62) Oct. 16; (86) Oct. 18.

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Railroads—(Continued).

- Demonstration Train on the Atchison, Topeka & Santa Fé Ry.* (18) Oct. 21.
 Uniform Signaling. (From paper read before the Ry. Signal Assoc.) (18) Oct. 21.
 Mikado Type Locomotives for the Great Northern Ry.* (18) Oct. 21.
 The American Railroad Ditcher.* (18) Oct. 21.
 Stresses in Locomotive Boilers.* W. H. Burleigh. (64) Oct. 24.
 Methods of Railway and Street Grade Separation in Cities. Robt. H. Whitten. (86) Oct. 25.
 Two Interesting Mountain Railways, Operated by Geared Locomotives.* (13) Oct. 26.
 Cable Incline Railways.* (13) Oct. 26.
 Aerial Tramway and Cable Inclines for Passenger Traffic in Colorado.* (13) Oct. 26.
 The "Tensio" Railway Screw-Coupling. (11) Oct. 27.
 Locomotive Efficiency and Condition Reports. N. D. Ballantine. (15) Oct. 27.
 A New Fourteen-Wheeled Express Locomotive.* Charles R. King. (19) Oct. 28.
 The Reclamation and Lining of Roper Tunnel on the Seaboard Air Line Railway, a Description of Handling a Large Cave.* Harvey Stanley. (14) Oct. 28.
 Steel Postal Construction and Specifications. (18) Oct. 28.
 The Cost of Transportation on the Erie Canal and by Rail.* (From *Bulletin*, Bureau of Ry. Economics.) (18) Oct. 28.
 A Steam Storage Locomotive Built by the Lima Locomotive & Machine Co.* (18) Oct. 28.
 A Safety Appliance Ladder.* (For Freight Cars.) (18) Oct. 28.
 The Grand Trunk Pacific Railway.* Frederick A. Talbot. (9) Nov.
 Instructions for Inspecting Bridges and Culverts, Great Northern Ry.* W. B. Irwin. (86) Serial beginning Nov. 1.
 A New System of Electric Industrial Railway.* (13) Nov. 2.
 Colorado & Southern Extension to Cheyenne.* (15) Nov. 3.
 The Peking-Kalgan Railway.* F. C. Coleman. (46) Nov. 4.
 Power and Transmission Methods of the Prussian Hessian State Railways.* (17) Nov. 4.
 Mikado Type Locomotives for the Missouri Pacific Ry.* (18) Nov. 4.
 La Traverse en Ciment Armé Idéale. (84) Sept.
 Le Tunnel sous l'Elbe, à Hambourg.* (84) Sept.
 Les Voles d'Accès au Simplon.* A. Mauguin. (38) Oct.
 Note sur Deux Types de Locomotives.* Séguela. (38) Oct.
 Le Chemin de Fer Electrique Nord-Sud de Paris, Production et Distribution du Courant.* (33) Oct. 21.
 Les Tunnels sous l'Hudson, à New York.* Alexandre Delisle. (33) Serial beginning Oct. 21.
 Drei neue Pyrenäenbahnen.* A. Bencke. (102) July 15.
 Die Beseitigung der Lokomotivschlacken. F. Zimmermann. (102) Serial beginning July 15.
 Untersuchung und Berechnung der Blasrohre und Schornsteine von Lokomotiven. Strahl. (102) Serial beginning Oct. 1.
 Widerstände von Zügen verschiedener Art. (102) Oct. 1.
 Schlitten-Lokomotive für Förderungen auf Schnee-Schlittenkufen.* A. Riehl. (102) Oct. 1.
 Der Blockapparat von Tyer in seiner neuesten Anordnung.* A. Tobler. (107) Oct. 14.
 Die vierachsigen Gaswagen mit Pressumpeneinrichtung der badischen Staatsbahnen.* Hefft. (102) Oct. 15.
 Verhalten der Angestellten bei Fahrhindernissen auf Hauptbahnen.* Simon. (102) Oct. 15.
 Dampf-Staubsauger von Köster.* J. Pintsch. (102) Oct. 15.
 Ueber elektrische Vollbahnbetriebe.* E. Scheichl. (53) Oct. 20.
 Die elektrische Bahn Biasca-Acquarossa.* W. Kummer. (107) Serial beginning Oct. 21.

Railroads, Street.

- New Subway for the City of Toronto.* (86) Oct. 11.
 A German Electric-Omnibus Trolley Line.* J. B. Van Brussel. (13) Oct. 12.
 Large New Carhouse at Los Angeles.* (17) Oct. 12.
 Two-Car Train Operation for City and Suburban Travel. C. J. Franklin. (Abstract of paper read before the Am. Elec. Ry. Transportation and Traffic Assoc.) (17) Oct. 13.
 Report of the Committee on Way Matters.* (Am. Elec. Ry. Eng. Assoc.) (17) Oct. 13.
 Semi-Steel Cars for Houston, Tex.* (17) Oct. 14.
 Report on Los Angeles Transit Conditions.* Bion J. Arnold. (17) Oct. 21.
 Operation of Near-Side Cars in Philadelphia.* (17) Oct. 21.
 Observations on Near-Side Cars in Buffalo. (17) Oct. 28.

*Illustrated.



Railroads, Street—(Continued).

Hearing in Buffalo on International Traction Reorganization, an Account is Given of the Methods used by B. J. Arnold in Determining the Cost to Produce New as of April 1, 1911, the Physical Property of the International Traction Company of Buffalo. (17) Nov. 4.

Sanitation.

A Successful Voluntary Joint Municipal Enterprise. (Description of Outlet Sewer for Counties of Essex and Union in the State of New Jersey.) Alexander Potter. (98) Sept.

Prestwich Sewage Scheme.* (104) Sept. 29.

The Engineering Problems of Land Reclamation.* A. M. Shaw. (Paper read before the Louisiana Eng. Soc.) (1) Oct.

The Sanitary Problems of the Catskill Aqueduct. David S. Flynn. (2) Oct.

Frome Sewage Purification Works. F. W. Jones. (Paper read before the Assoc. of Somerset Surveyors.) (104) Oct. 6.

Notes on the Theory and Practice of Percolating Filters. J. E. Farmer. (Paper read before the Assoc. of Managers of Sewage Disposal Works.) (104) Oct. 6.

Fan System versus Direct Radiation.* Ira N. Evans. (64) Oct. 10.

Toronto Main Drainage Works.* (96) Oct. 12.

The Relative Values of Different Public-Health Procedures. H. W. Hill. (13) Oct. 12.

Capacity of Conductor Pipes.* (101) Oct. 13.

Heating and Ventilating High School Buildings.* Samuel R. Lewis. (105) Oct. 13.

A Storm-Water Sewer at La Grange.* (14) Oct. 14.

The Blissville Trunk Sewers in Long Island.* (14) Oct. 14.

Notes on Collecting the Sewage of New York City at a Central Point. (14) Oct. 21.

Methods, Diagram and Formulas for the Design of Tie Drainage Systems.*

Benj. L. Parker. (86) Oct. 25.

Six Months' Financial Operating Results of the Garbage-Reduction Plant of

Columbus, Ohio. (13) Oct. 26.

New Main Low-Level Sewer for the South Side of London. R. M. Gloyne. (Abstract of paper read before the Inst. of Mun. and County Engrs.) (12) Oct. 27.

Operating Results of the Sewage Clarification Works of Emschergerossenschaft.* P. E. Mebus. (Abstract from *Technisches Gemeindeblatt*.) (86) Nov. 1.

A Subway Tube as a Temporary Storm Water Sewer.* (14) Nov. 4.

Aerobic and Anaerobic Decomposition of Sewage. George W. Fuller. (14) Nov. 4.

The Disposal of the Sewage of Chicago. (14) Nov. 4.

Structural.

An Analysis of the Stresses in Guy Wires.* W. M. Wilson. (4) Oct.

Economic Construction of Storage Bins and Trestles at Cement Plants.* W. S. Marston. (4) Oct.

Manufacture and Use of Concrete Blocks.* Robert F. Havlik. (67) Oct.

Cement Stock Houses.* Josiah Gibson. (67) Oct.

Destruction of Cement Mortars and Concrete through Expansion and Contraction.*

Alfred H. White. (67) Oct.

The Aligning of Shafting.* George W. Loggie. (Paper read before the National Assoc. of Cotton Manufacturers.) (20) Oct. 12.

Report of the Committee on Buildings and Structures.* (Am. Elec. Ry. Eng. Assoc.) (17) Oct. 13.

The Foundations of the Bamberger Building, Newark.* (14) Oct. 14.

The New Canadian Pacific Terminal at Victoria Harbor; The Eastern Lake Terminus of a New Grain Route Includes Harbor Work, Wharf Construction,

Elevator and Warehouse Erection.* G. G. Ommanney. (14) Oct. 14.

Structural Details of the Addition to the Hotel Astor, New York.* (14) Oct. 14.

Tests of Nickel-Steel Riveted Joints. (From *Bulletin*, Univ. of Ill. Exper. Station.) (62) Oct. 23.

Why do Reinforced-Concrete Buildings Fall? Ernest McCullough, M. Am. Soc. C. E. (13) Oct. 26.

A Light Reinforced-Concrete Prison Wall at the New Jersey Reformatory, Rahway, N. J. Wm. M. Torrance, M. Am. Soc. C. E. (13) Oct. 26.

A Reinforced Concrete Candy Factory.* Arthur G. Hoadley. (14) Oct. 28.

The Foundation Girders in the United Fire Company's Building, New York.* (14) Oct. 28.

Cost of Constructing Stamp-Mills. Charles T. Hutchinson. (103) Oct. 28.

Fixed-End Columns in Practice.* C. T. Morris, M. Am. Soc. C. E. (13) Nov. 2.

Underpinning a Reinforced-Concrete Factory Building.* (14) Nov. 4.

Two High Chimneys for a Boston Sugar Refinery. (14) Nov. 4.

A Subway Delivery Entrance at the Rockefeller Estate.* (14) Nov. 4.

Appareil pour la Mesure Directe de la Charge d'un Fil Métallique Tendue.* F. Largier. (33) July 22.

L'Expansion et le Retrait du Béton lors de sa Prise.* (84) Sept.

*Illustrated.



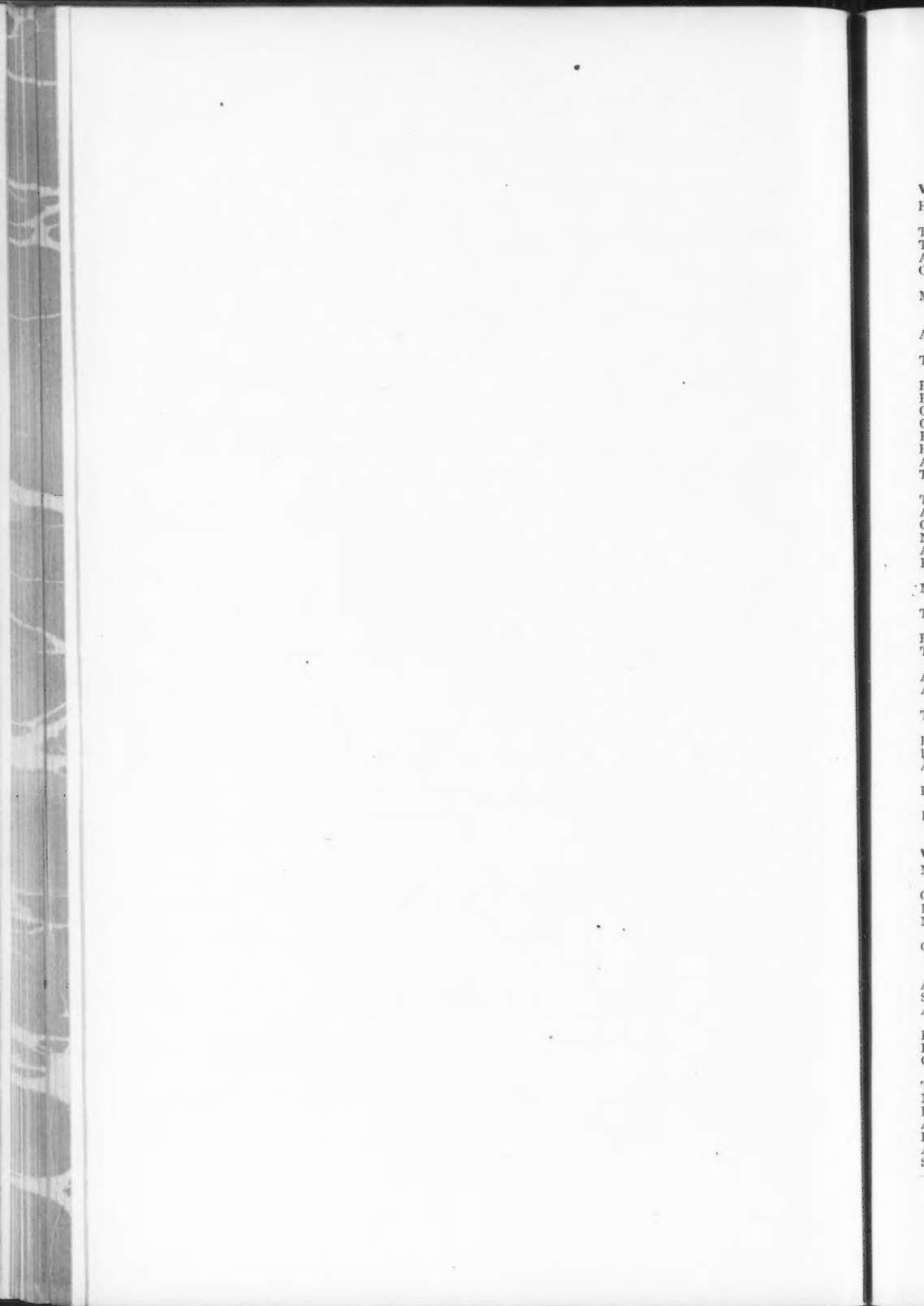
Structural—(Continued).

- Vitesse Dangereuse du Choc entre Deux Barres, Remarques sur le Mémoire de M. Henry. J. Resal. (93) Oct.
- Tensions dans les Metaux Déformés à Froid.* Heyn et Bauer. (93) Oct.
- Eisenbetonkonstruktionen bei Biegung und bei exzentrisch wirkenden Druck- oder Zugkräften, Einheitliche Verfahren zur Bemessung derselben. Rich. Wuczkowski. (79) Vol. 15.
- Unmittelbare Dimensionierung von Eisenbeton-Querschnitten für zusammengesetzte Festigkeit.* (51) Serial beginning Sup. 19.
- Kurven reiner Schubbeanspruchung des geraden Balkenträgers rechteckigen Querschnittes. Josef Wagner. (53) Serial beginning Sept. 29.
- Das neue Krankenhaus der Wiener Kaufmannschaft.* Ernst v. Gotthilf. (53) Sept. 29.
- Die neue Halle für die Turbinenfabrik der Allgemeinen Elektrizitäts-Gesellschaft in Berlin.* Karl Bernhard. (48) Serial beginning Sept. 30.
- Eisenbetonkonstruktionen im Neubau des Neumarkt-Schützenhauses zu Halle a. S.* C. A. Einbeck. (78) Oct. 2.
- Versuche über den Einfluss des Zusatzes von Alaun und Seife auf das Abblinden von Zement sowie auf die Erhärtungsfähigkeit (Festigkeit) und Wasserdichtigkeit von Zementmörtel.* H. Burchartz. (78) Oct. 2.
- Ueber das Schmelzen und Verdampfen unserer sogenannten hochfeuerfesten Stoffe. Otto Ruff und Otto Goecke. (80) Serial beginning Oct. 5.
- Das Solothurnische Lungensanatorium Allerheiligen.* (107) Oct. 7.
- Die Hetzersche Holzbauweise.* (107) Oct. 14.
- Festigkeitsversuche unter allseitigem Druck.* Th. v. Kármán. (48) Oct. 21.
- Maschinenfundamente aus Eisenbeton.* E. Elwitz. (78) Oct. 25.
- Eisenbetonbauten mit Kähnelen-Bewehrung im Deutschen Reiche.* E. Morgenstern. (78) Oct. 25.
- Kassettenplatten.* W. Gutacker. (78) Oct. 25.

Water Supply.

- Investigations of Flow in Brick Lined Conduits.* John Ericson. (4) Oct.
- Water Resources of the State of New York.* Walter McCulloh. (Paper read before the Bost. Soc. of Civ. Engrs.) (1) Oct.
- Securing a Water Supply.* (87) Oct.
- The Sanitary Problems of the Catskill Aqueduct. David S. Flynn. (2) Oct.
- The Palgton Waterworks. J. C. Hawkins. (Paper read before the Inst. of Mun. and County Engrs.) (104) Oct. 6.
- New Water Supply for Lincoln.* (12) Oct. 6.
- The Vigeland Aluminum Works, South Norway.* G. Wüthrich. (12) Serial beginning Oct. 6.
- Proposed Hydro-Electric Power Plant for Chester.* (12) Oct. 6.
- New Waterworks for Birkenhead.* (12) Oct. 6.
- Cost of Laying Cast Iron Water Pipe in the City of Chicago. (86) Oct. 11.
- Graphical Design of Shoes for Bands of Wood-Stave Pipe.* E. A. Moritz. (13) Oct. 12.
- The Measurement of Soil Evaporation under Arid Conditions.* Charles H. Lee. Assoc. M. Am. Soc. C. E. (13) Oct. 12.
- Carno Reservoir Embankment and Filter Beds, New Water Supply for Ebbw Vale.* (12) Oct. 13.
- Progress of Construction Work for Keokuk Water-Power Development.* (27) Oct. 14.
- The Destruction of the Austin Dam.* (14) Oct. 14.
- Constructing a Concrete Headgate in Winter.* J. D. McGaughey. (14) Oct. 14.
- The Flood Damage at the Hatfield Reservoir, Wisconsin.* (14) Oct. 14.
- The Operation of the Pittsburg Water Purification Works; Notes on Sand Handling and on Filter Surface Raking. (14) Oct. 14.
- A Submerged Concrete Intake at San Diego.* (14) Oct. 14.
- Handling Large Steel Pipe in the Trench by a Novel Method.* Charles H. Howe. (14) Oct. 14.
- New Use for Deep Well Pump.* W. T. Griffith. (64) Oct. 17.
- Rates of Depreciation of Water Works Plants and Electric Plants. (86) Oct. 18.
- Methods and Cost of Constructing East Park Dam, California, Orland Project. U. S. Reclamation Service.* E. G. Hopson. (86) Oct. 18.
- Drills with Long Column Arms for Work in Tunnels (New York Water Supply).* (13) Oct. 19.
- Failure of the Dells and Hatfield Dams and the Devastation of Black River Falls, Wis., Oct. 6, 1911.* W. D. Pence, M. Am. Soc. C. E. (13) Oct. 19.
- Reinforced Concrete Pipes. Arch. Currie. (Paper read before the Union of Canadian Municipalities.) (96) Oct. 19.
- Some Thoughts Suggested by the Austin Dam Failures Regarding Text Books on Hydraulic Engineering and Dam Design in General. John R. Freeman. M. Am. Soc. C. E. (13) Oct. 19.
- Minneapolis Mechanical Water Filtration Scheme.* (96) Oct. 19.
- Gaugings in the Concrete Conduit of the Umatilla Project.* (14) Oct. 21.
- An Emergency Water Supply at Worcester. (14) Oct. 21.

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Water Supply—(Continued).

- High Duty Performance at the Cincinnati Water-Works. S. G. Pollard. (14) Oct. 21.
- The Use of Coagulants with Slow Sand Filtration. (14) Oct. 21.
- The Reservoir Breaks on the Black River, Wisconsin.* (14) Oct. 21.
- A Small Hydroelectric Plant on the Oswegatchie River.* (14) Oct. 21.
- Causes and Prevention of Corrosion.* (For Water Pipes.) L. B. Taylor. (64) Oct. 24.
- Methods and Cost of Constructing a Rock Fill Dam with Concrete Face in Australia.* A. J. Debenham. (Abstract of paper read before the Sydney Univ. Eng. Soc.) (86) Oct. 25.
- A Portable Hypochlorite Disinfecting Plant. (For Water Supply.)* J. A. Childs. (86) Oct. 25.
- The Salt Water Circulating System of the San Diego Electric Railway.* L. R. W. Allison, Assoc. Am. Inst. E. E. (13) Oct. 26.
- Report on Distributed Load Test on 66 Inch Cast Iron Pipe.* (96) Oct. 26.
- Hydraulic Power and Irrigation in France.* (96) Oct. 26.
- Corrosion of the Western Australian Goldfields Water Supply Pipe. (12) Oct. 27.
- Concrete Cisterns Above Ground.* (101) Oct. 27.
- British-Canadian Power Company.* G. C. Bateman. (16) Oct. 28.
- Repairing a Deeply Submerged Water Main.* (14) Oct. 28.
- A Reinforced Concrete Reservoir at Somerset.* (14) Oct. 28.
- The Newton Pressure Tunnel of the Metropolitan Water Works Supplying the Boston District.* (14) Oct. 28.
- The Relative Corrosion of Metal Pipes by Waters. (14) Oct. 28.
- A Large Hydraulic Step-Bearing. (14) Oct. 28.
- Operation of Providence Filters. (14) Oct. 28.
- New Pumping Station for London.* J. B. Van Brussel. (64) Oct. 31.
- An Experience with a Contaminated Deep Well. Wm. Paul Gerhard. (70) Nov.
- Ignorance of the Coefficient of Sliding Friction Between Rock Substrata a Cause of Dam Failures. (86) Nov. 1.
- Methods and Results of Duty of Water Investigation in Idaho.* Don H. Bark. (86) Nov. 1.
- Tests of Water Sterilizing and Purifying Methods at Marseilles, France.* (13) Nov. 2.
- Reinforced Concrete Pipe Siphons in California.* (14) Nov. 4.
- The Probable Cause of the Austin Dam Failure.* Walter H. Sawyer. (14) Nov. 4.
- A High Rock-Fill Dam with Concrete Facing in Colorado.* (14) Nov. 4.
- A Formula and Diagram for Determining the Velocity of Flow in Ditches and Canals.* Clarence T. Johnson. (14) Nov. 4.
- The Halligan Dam on the Cache La Poudre River; a Reinforced Masonry Structure of the Arch Type.* (14) Nov. 4.
- Réservoir avec 24 Metres de Hauteur d'Eau. (84) Sept.
- Der Energie-Satz der kreisenden Flüssigkeit.* Donát Bánki. (48) July 22.
- Automatische Stau- und Abflussvorrichtungen.* J. Huber. (107) Serial beginning Sept. 30.
- Die Ausnutzung der Wasserkräfte der Wilden Gutach durch die Firma Güterman et Cie. in Gutach i. Br.* H. Mees. (78) Oct. 2.
- Fehler bei Wehrbauten in Eisenbeton, Dansville- und Austin-Damm.* Ziegler. (48) Oct. 21.

Waterways.

- Modern Electrical Dock-Equipment with Special Reference to Electrically-Operated Coal-Holts.* Walter Dixon and George H. Baxter. (75) Jan.
- German Waterways.* Edwin J. Clapp. (65) Oct.
- Power Derivable from Ocean Waves.* Franklin Van Winkle. (64) Oct. 17.
- Methods and Costs of Construction on Contract Section Eleven, New York State's Barge Canal.* E. J. Becker. (86) Serial beginning Oct. 18.
- Opportunities for Contractors on the U. S. Improvements of the Upper Mississippi River, with Description of Plant Required and Data for Estimating.* Charles W. Durham. (86) Oct. 18.
- A Derrick for Deep-Water Soundings.* Emile Low. (13) Oct. 19.
- Standard Timber Bulkheads of the City of Seattle, Wash.* (13) Oct. 19.
- A New Method of Dragging a Channel for High Spots.* Edward W. Wendell. (13) Oct. 19.
- Patching Holes in a Concrete Sea Wall with the Cement Gun.* (14) Oct. 21.
- Fender Chains for Panama Locks.* (62) Oct. 23.
- Costs of Dredging Main Canals on a 2,850 Acre Drainage Project in Louisiana.* (86) Oct. 25.
- The New Immingham Dock.* (57) Oct. 27.
- Masonry Bulkhead Wall on a Timber Deck at Providence.* (14) Oct. 28.
- Harbor and Terminal Improvements at Boston, Mass.* (13) Nov. 2.
- A Traveling Stage for Marine Construction.* (13) Nov. 2.
- Powerful Dredger for Panama Canal.* (46) Nov. 4; (12) Oct. 20.
- A Miscellaneous Freight Pier at Communipaw.* (14) Nov. 4.
- Staatliche Wasserbauten in Böhmen.* Hugo Franz. (53) Oct. 13.

*Illustrated.